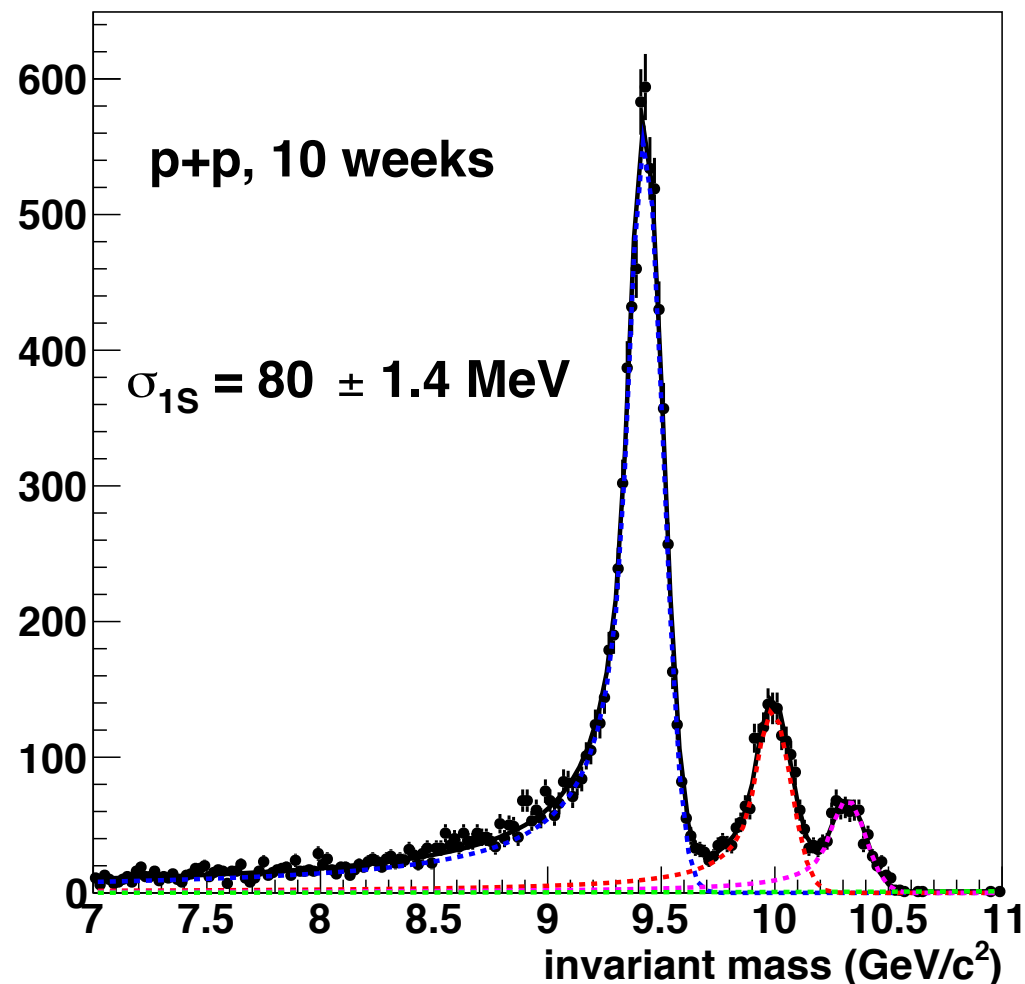


Upsilons

Tony Frawley and Marzia Rosati
January 267, 2017

What has been shown in the past

$Y(1S,2S,3S) \rightarrow e^+e^-$



Use **dielectrons**

Minimal mass of tracking detector (TPC)

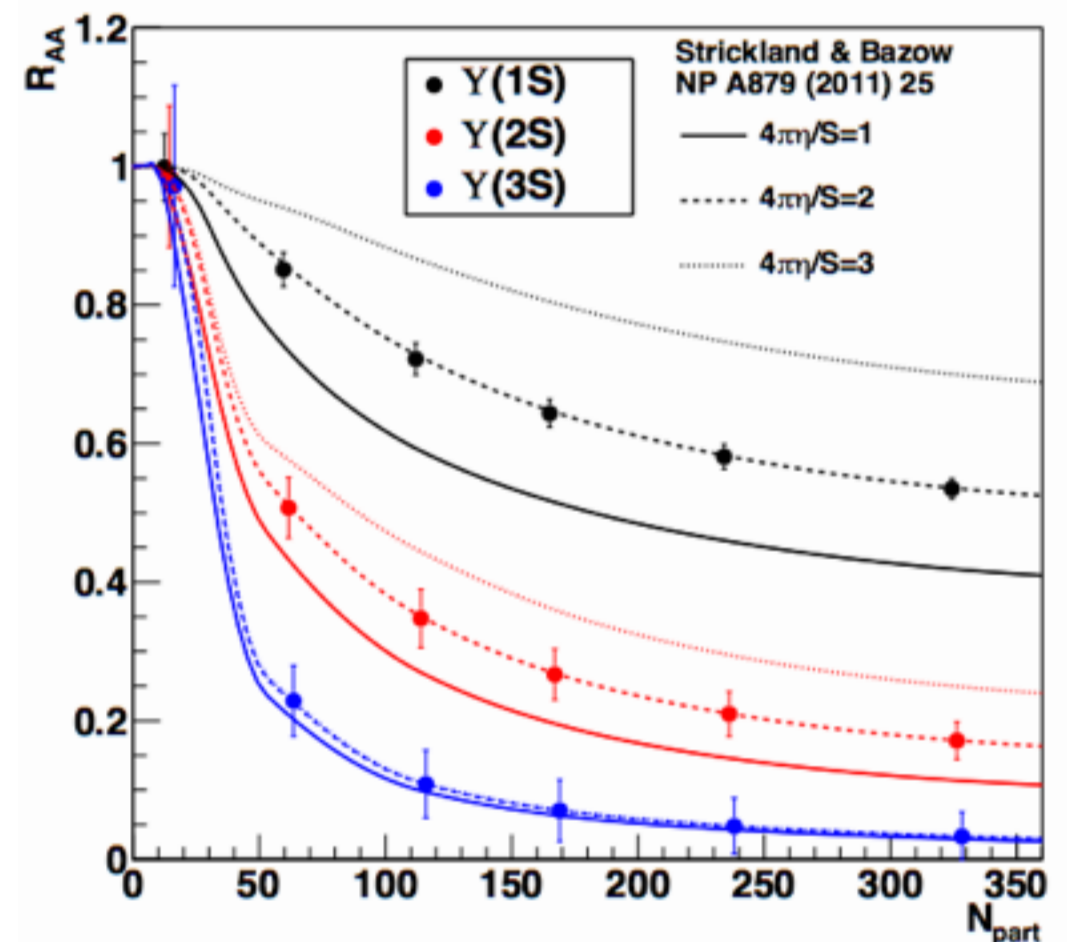
=> good mass resolution

=> minimal radiative tail

Electron identification from EM + hadronic calorimeter => E/p measurement

Expected statistics for R_{AA} assuming model suppression

- 1 year p+p and 1 year Au+Au running
- (p+p 10 weeks, Au+Au 22 weeks)



Problem with mass resolution

The plots on the previous slide were made with a cylinder model of the tracker in which it was assumed that the average thickness of the INTT tracker would be 1% of a radiation length per layer - i.e. 4% for 4 layers.

After the INTT ladder model was added to our simulation, we found from a material scan that the average thickness of the INTT is actually $\sim 1.9\%$ per layer - 7.4% for 4 layers.

This pushes the mass resolution for the Upsilon to ~ 108 MeV, and makes the radiative tail much worse. It is not usable.

Longer term: We need to understand what to do about this. We could for example drop the number of INTT layers to two (reduces mass resolution to 92 MeV). Or possibly some improvement in the tracking will save us (but don't count on it).

Short term: We need to decide how to deal with this at QM2017. Marzia and I discussed this:

- We think that for now we should stick with what is in our last public document.

Background estimates

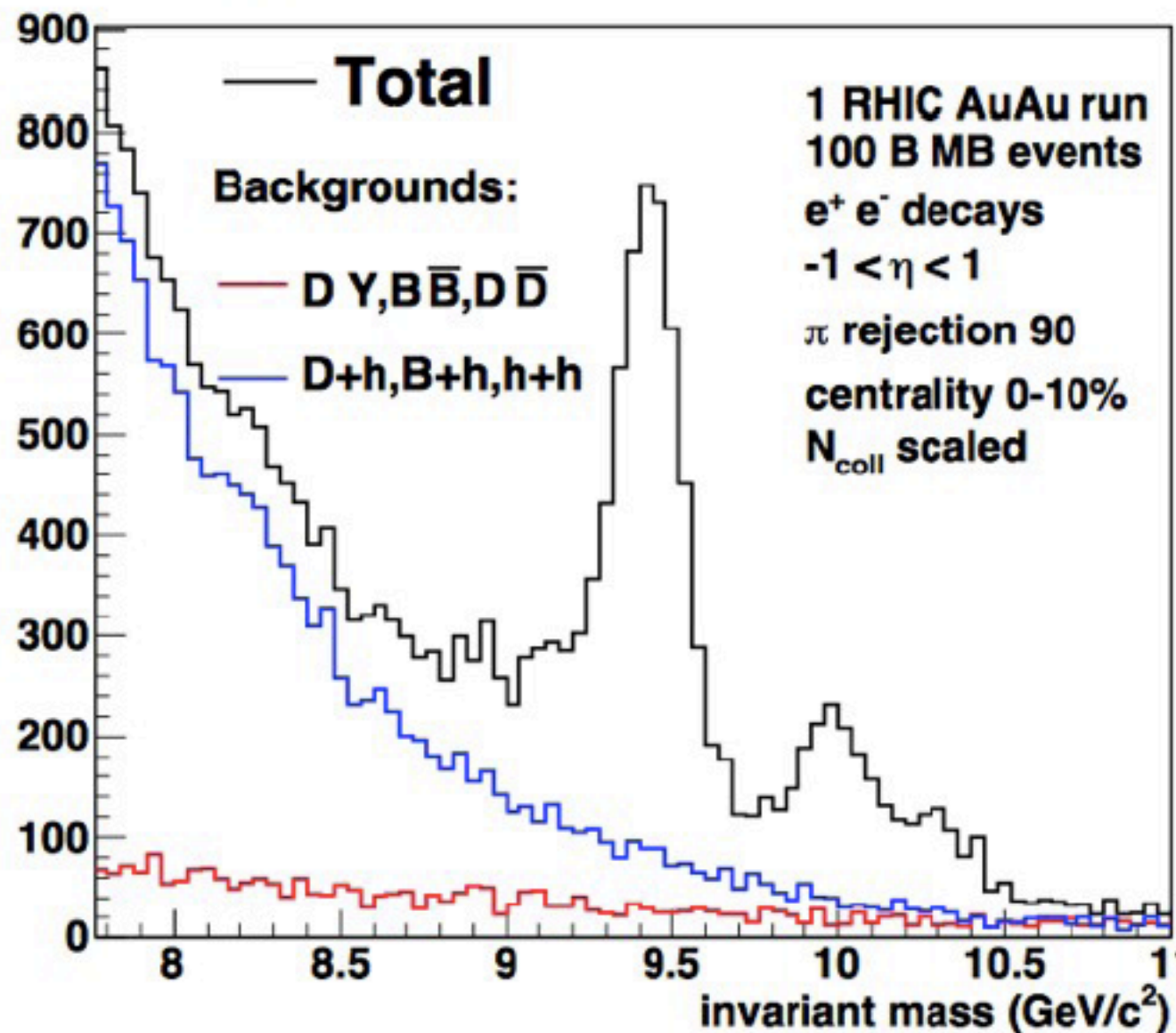
Sasha Lebedev has done a lot of work on more realistic background estimates for the Upsilon measurement, but that still needs some work. It should be done later this spring.

His conclusions are generally similar to our initial estimates
Again, we suggest staying with what has been shown in the past.

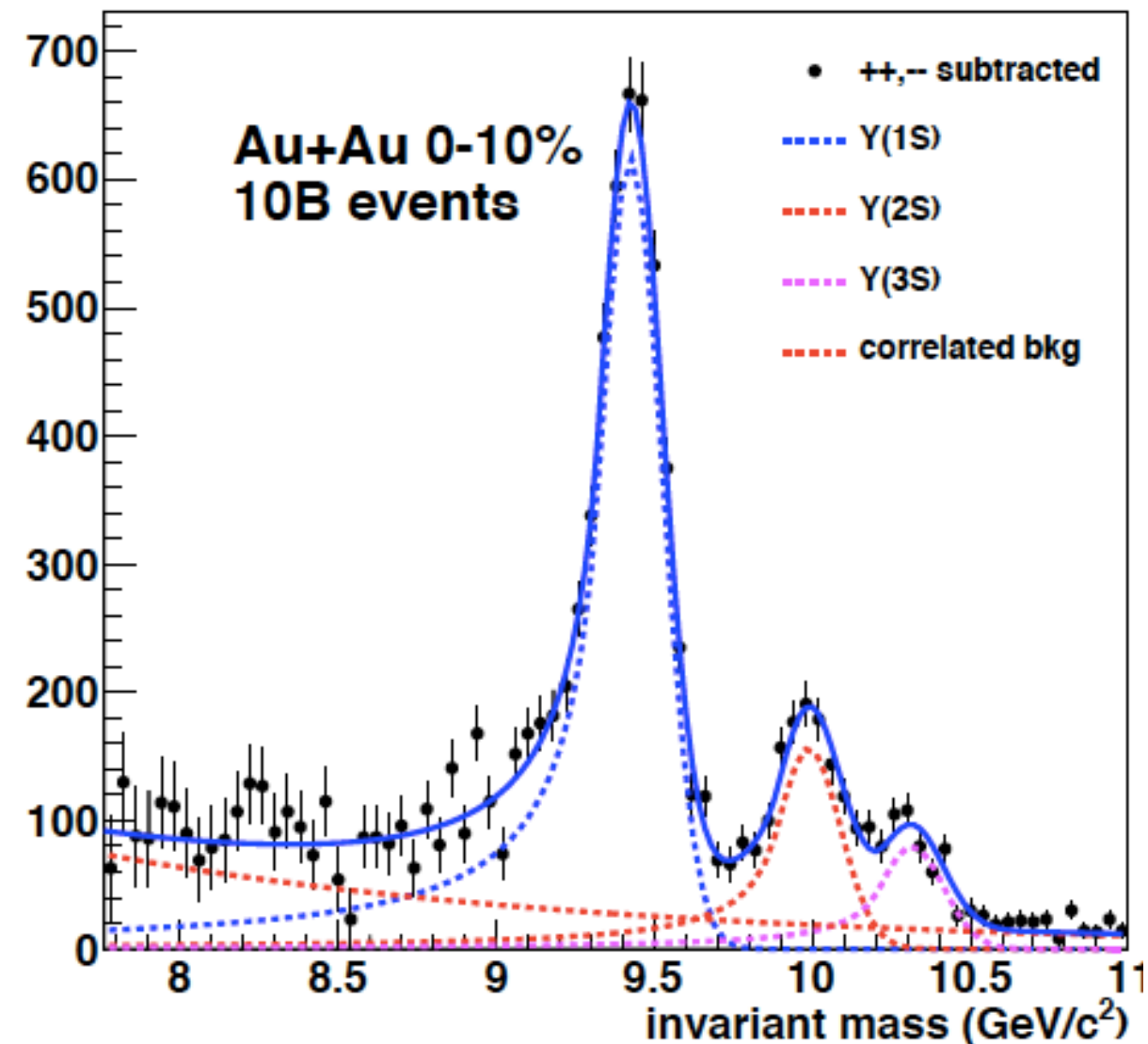
Revised MIE DOE review plots

These have 99 MeV resolution, and look OK

Y(1S,2S,3S)



Y(1S,2S,3S)



Conclusions

The result of 80 MeV resolution from our earlier simulations (which are reproducible if we use 4% for the average thickness in a cylinder model) are too optimistic.

Simulations with the ladder geometry in which only two layers in the INTT are used (4% total INTT thickness) produce a mass resolution of 92 MeV. This may very well be improved by tracker work.

We are reluctant to show any plots with a mass resolution better than 90 MeV until we know more.

Suggestions?